# Benefits Derived From Material Standardisation: A Study Of Small Manufacturing Firms

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**Key Words:**
1. Variables
2. Inventory Management
3.Small Scale Industries (SSIs)

**Abstract**
Inventory costs are the basic costs which influences the whole business design. It connotes the diverse costs involved (Storage, Perishability, safety etc) in managing inventories. The present study divulges the mean rating of inventory variables that affects inventory management in 44 small scale units operating in district Udhampur of J&K State divided into ten lines of operations. The research framework was examined by empirical analysis of primary data collected. Validity and reliability of the scales in the construct were assessed through BTS and Cronbach-alpha. The results of ranking tables revealed that the major variables affecting inventory management are Overall inventory turnover ratio, Raw material inventory turnover ratio, Work-in-process inventory turnover ratio, Finished goods inventory turnover ratio and Out of stock index. The variable Raw material inventory turnover ratio emerged as the main variable affecting inventory management and out of stock index being the least decipherable effectuating variable deployed in managing inventories.

## INTRODUCTION

Material standardisation is upgrading the stock or inventories. It's fixing the qualitative standards/norms for the stock/inventory. Inventory is the stock of any item or resource used in an organization. Knowledge about material standardisation to managers is vital for enhancing product quality, service enhancement (Huang, 2006), improving competitive ability (Wong et al., 2005) and operational flexibility through pull systems (Suri, 1998). Several scholars and practitioners conveyed these approaches under different labels such as time-based competition and lean manufacturing (Womack et al., 1990). Lead time reduction is often described in the operations management literature as arising from initiatives such as JIT/lean production or agility rather than from identifying and reducing congestion at bottlenecks, reducing lot sizes and moving to a product layout from a functional one. Koufteros et al. (1998) claim time-based manufacturing is related to shop-floor employee involvement, setup time reduction, cellular manufacturing, quality improvement efforts, preventive maintenance, dependable suppliers and pull production, but do not relate these constructs to the principles that drive lead time. According to Schmenner (2001), companies that focus on flow with an emphasis on operational speed and variability reduction outperform companies emphasizing other goals. This conclusion is consistent with the principles of operations management based on queuing theory, which demonstrates the relationships between lot sizes, cycle times, bottlenecks, lead times and process variability (Husun & Nanda, 1995).

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## REVIEW OF LITERATURE

Inventory standardisation has also been a subject in the debate on supply chain resilience, which has been of increasing interest in recent years, particularly as the "leaning-down" of companies and global sourcing have increased supply chain risks (Christopher & Peck, 2004). It is recognised that international supply chains may be particularly vulnerable owing to such factors as the geographic area covered, the transport modes used, political/border factors and environmental issues (Prater et al., 2001). Whilst risk mitigation strategies may contain many elements, the use of inventory is generally recognised as one possible tool. For example, Chopra and Sodhi (2004) list "increase inventory" as a risk mitigation approach, whilst Christopher and Peck (2004) state that "the strategic disposition of additional capacity and/or inventory at potential 'pinch points' can be extremely beneficial in the creation of resilience within the supply chain". Lee (2002) particularly emphasizes the role of inventory in situations of supply uncertainty. There are thus widely varying views about the role of inventory in the literature and some of these views appear to have conflicting goals. For example, the goal of traditional inventory control theory has been the optimisation of inventory levels, whereas the goal discussed


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in more recent thinking, such as that on lean and agile supply chains, has concentrated more on the minimisation of inventory levels. However, the latter has been counteracted to some extent by the understanding of the role of decoupling points and the part that inventory may play in some risk mitigation strategies. Whilst the minimisation of inventory is widely discussed, this needs to be defined and there is a recognition that resources can be reduced too much, leading to terms such as "corporate anorexia" (Radnor & Boaden, 2004). This suggests that there is in fact an optimum level of inventory. However, the identification of this level needs to involve wider concepts than those just associated with traditional inventory control theory. Inventory holding plays an important role in modern supply chains. A survey of logistics costs in Europe identified the cost of inventory as being 13 per cent of total logistics costs (Establish Inc/AT Kearney, 2004). A similar study in the USA, found inventory costs significantly higher at 24 per cent (European Logistics Association/Herbert W. Davis & Co., 2005). The present research empirically reveals the benefits accrued from materials standardisation by small scale industries with the abet of data collected from 44 small manufacturing firms operating under SIDCO & SICOP in District Udhampur of Jammu & Kashmir State.

## RESEARCH DESIGN AND METHODOLOGY

Research design and methodology comprises area of research, nature of data/information (Primary or secondary), questionnaire/schedule, research tools applied etc. The research methodology adopted proceeds as follows:

## SAMPLING AND DATA COLLECTION

The primary data for the study were collected from 44 functional manufacturing SSIs out of 49 units registered under District Industries Centre (DIC), Udhampur of J&K State. Five units were found to be non functional. The manufacturing units were sub-divided into ten lines of operation comprising cement (8), pesticide (3), steel (3), battery/lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3) and miscellaneous (11). The miscellaneous category includes small scale units namely M/s Supertech Industry, M/s Luxmi Electronics Works, Shaj Nath Vanaspati Ltd., M/s Aditiya Cables, Poles and Transformers, Shankar Lime Industry, M/s Unique Carbon Industries, M/s B.S Traders, M/s Vijay Candles, Everest Health Care Products, M/s J.K Petro Chemicals, M/s Ajay Ice Factory. Census method was used to elicit response from owners/managers of the SSIs.

## THE SURVEY INSTRUMENT

Information was collected by administering self developed questionnaire prepared after consulting experts and review of literature which comprised of general information and 37 statements of material standardisation. Statements in the questionnaire were in descriptive form, ranking, dichotomous, open ended and five -point Likert scale, where 1 stands for strongly disagree and 5 for strongly agree.

## COLLECTION OF DATA

The primary data were collected by making three to four visits for getting response from respondents. Census method was applied for collecting data from the respective respondents. The secondary information was collected from various sources namely books, empirical papers from online & hard copies of journals. Various multivariate tools such as Mean, standard deviation, Ranking tables were used for drawing meaningful inferences.

## RELIABILITY AND VALIDITY OF THE INSTRUMENT

Reliability: The alpha reliability coefficients for F1 (0.802), F2 (0.823), F3 (0.829) is higher than the criteria of 0.77 obtained by Gordon and Narayanan (1984) indicating high consistency. F4 (0.627) and F5 (0.605) are also at a minimum acceptable level of 0.50 as recommended by Brown et al. (2001) and Kakati and Dhar (2002) thereby obtaining satisfactory internal consistency (Table 1.1).

## VALIDITY

The content validity of the scale was calculated by meeting various experts/academicians/eminent research scholars. The five factors obtained alpha reliability higher & equal to 0.50 and satisfactory KMO value at 0.688, indicating significant construct validity of the construct (Hair et al., 1995).

## DATA ANALYSIS AND INTERPRETATION

Table 1.2 squeals mean rank of benefits derived from material standardisation by small manufacturing firms operating in District Udhampur of J&K State. These 44 small manufacturing firms have been divided into ten lines of operations namely cement (8), pesticide (3), steel (3), battery/lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3) and miscellaneous (11). The different benefits that a business can accrue out of material standardisation exhibited are "Quality is ensured", "Optimum production is possible", "No switching costs", "Better utilization of resources", "Helps in fixing target markets", maintenance of optimum stocks need to be maintained" and "Less maintenance costs". On the basis of ranks assigned to mean values, "Quality is ensured" is accorded rank one by all the firms except for menthol. "Optimum production is possible" is given rank


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second except menthol and miscellaneous. "Better utilization of resources" came up with rank three. "Helps in fixing target markets" egresses with rank four and is followed by "No switching costs" with fifth rank. The sixth and seventh mean ranks are given to "Maintenance of optimum stocks" and "Less maintenance costs". The ranking categorization is done as follows:

**CEMENTS**

There are eight cements units working in district Udhampur namely: M/s Associated Cements, Zenith Cement Industry, Shivalik Cements, M/s Continental Cement Industry, Wullar Cements, M/s Shri Nath Industry and Uma Cement Industry. As far as mean ranking related to the benefits derived from material standardisation of these units is concerned "Quality is ensured" was accorded rank one by all the units operating under this group. "Optimum production is possible" was given rank two by cement industry and "Better utilization of resources" was consigned rank three. "Helps in fixing target markets" was accorded rank four with subsequent following of "No switching costs" with rank five. Further, "Optimum stocks need to be maintained" and "Less maintenance costs" were accorded rank six and seven as disclosed by their mean values. It was clear that the cement industry was of the purview that quality is ensured with the abet of apt material standardisation.

**BATTERY/LEAD/ALLOY**

Five firms operating under this category were Radha Industries, Pilot Batteries, Durga Batteries, Suraksha Batteries and Avtar Batteries. "Quality is ensured" was accorded rank one by all the units operating under this group as it was found the main benefit derived from inventory standardisation. "Optimum production is possible" was given rank two by these small firms and "Better utilization of resources" was relegated rank three. "Helps in fixing target markets" was accorded rank four with subsequent following up of "No switching costs" with rank five. Accordingly, "Optimum stocks need to be maintained" and "Less maintenance costs" were accorded rank six and seven as depicted by their mean values and is represented in the table 1.2.

**PESTICIDES/INSECTICIDES**

Under this category three units are operating namely M/s Dhanuva Agritech Ltd., Safex Chemicals Ltd. and M/s Modern Insecticides. As far as ranking related to benefits derived from material standardisation of these firms is concerned "Quality is ensured" was accorded rank one by all the units operating under this group. "Optimum production is possible" was given rank two by these firms and "No switching costs" was assigned rank three. "Better utilization of resources" was accorded rank four with subsequent following of "Helps in fixing target markets" with rank five. Moreover, "Optimum stocks need to be maintained" and "Less maintenance costs" were accorded rank six and seven as depicted by their mean values and is represented in the table 1.2. It was clear that the main benefit derived from material standardisation previewed was ensuring of quality.

**CONDUIT PIPES**

Two units operating under this group were M/s Pee Kay Products and Rukhmani Plastics. As far as ranking related to the benefits derived from material standardisation by these firms is concerned "Quality is ensured" was accorded rank one by both the units operating under this group. "Optimum production is possible" was given rank two by conduit pipes and "No switching costs" was consigned rank three. "Better utilization of resources" was accorded rank four with subsequent following up of "Helps in fixing target markets" with rank five. "Optimum stocks need to be maintained" and "Less maintenance costs" were accorded rank six and seven as depicted by their mean values and is represented in table 1.2. It was clear that the conduit pipes industry main benefit derived from material standardisation previewed was ensuring of quality.

**MENTHOL**

M/s Harikripa Perfumes Pvt. Ltd. and M/s Mahadurga Industries were found to be operating under this category of industries. "Optimum production is possible" was accorded rank one by both the units operating under this group as it was found the main benefit derived by these units. "Quality is ensured" was given rank two by these small firms and "Helps in fixing target markets" was consigned rank three. "Better utilization of resources" was accorded rank four and "No switching costs" was designated rank five. "Optimum stocks need to be maintained" and "Less maintenance costs" were accorded rank six and seven respectively.

**GUNS**

Two competitors namely M/s Gulab Gun Factory and M/s Hunter Gun Factory accorded rank one to "Quality is ensured" as it was found to be their main benefit derived by material standardisation, "Optimum production is possible" ranked two, "Better utilization of resources" ranked three, "Helps in fixing target markets" ranked four and "Optimum stocks need to be maintained" ranked five. The other variables/benefits i.e "Less maintenance costs" and "No switching costs" were accorded rank six and rank seven respectively.


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**STEEL**

M/s Maha Luxmi Steel Fabricators, M/s Faqir Chand Sanak Raj and M/s Gupta Furniture are operating under this category. Rank one was assigned to "Quality is ensured" as it was found to be their main benefit derived. "Optimum production is possible" ranked two, "Better utilization of resources" ranked three, "Optimum stocks need to be maintained" ranked four and "Helps in fixing target markets" ranked five. The other variables/benefits i.e "No switching costs" and "Less maintenance costs" were accorded rank six and rank seven respectively.

**GATES/GRILLS/VARNISH/PAINT**

Five units are operating under this category namely M/s Balaji Industries, M/s Wazir Engineering Works, ISRO Products, Shakti Engineering Works and M/s Everest Paints. These small scale units assigned rank one to "Quality is ensured". "Optimum production is possible" was given rank two by these units, "Better utilization of resources" was allotted rank three, "Optimum stocks need to be maintained" was aligned rank four and "Less maintenance costs" ranked five. "No switching costs" and "Helps in fixing target markets" were relegated rank six and seven.

**ATTA/MAIZE/DAL MILLS**

Shalimar Floor Mills, M/s Udhampur Dal Mills and M/s Sharda Enterprises are functioning under this class. As far as ranking related to benefits derived from material standardisation by these firms is concerned "Quality is ensured" was accorded rank one by all the units operating under this group. "Optimum production is possible" was given rank two by this industry. "Better utilization of resources" was consigned rank three. "Helps in fixing target markets" was allotted rank four and "No switching costs" ranked five. "Optimum stocks need to be maintained" and "Less maintenance costs" were accorded rank six and seven as depicted by their mean values.

**OTHERS (MISCELLANEOUS)**

Eleven units operating under this group were M/s Supertech Industry, M/s Luxmi Electronics Works, Shaj Nath Vanaspati Ltd., M/s Aditiya Cables, Poles and Transformers, Shankar Lime Industry, M/s Unique Carbon Industries, M/s B.S Traders, M/s Vijay Candles, Everest Health Care Products, M/s J.K Petro Chemicals and M/s Ajay Ice Factory. As far as ranking related to to benefits derived from material standardisation by these firms is concerned "Quality is ensured" was accorded rank one by most of the units and "Better utilization of resources" was given rank two by almost all the units operating, "Optimum production is possible" was appropriated rank three, "Helps in fixing target markets" was allotted rank four and "Optimum stocks need to be maintained" rank five respectively. "No switching costs" and "Less maintenance costs" were accorded rank eix and seven respectively.

Overall, these small manufacturing firms are also imbibing quality consciousness in manufacturing operations to reach diverse markets and achieving consistent growth in sales. The crux of the theme is that all the firms operating under DIC (SIDCO & SICOP) were mainly befitted for: firstly, "Quality is ensured", then by "Optimum production is possible", afterwards "Better utilization of resources", then by "Helps in fixing target markets", then "No switching costs" with fifth rank and lastly by "Maintenance of optimum stocks" and "Less maintenance costs" as depicted by their respective mean ranks (Table 1.2).

**CONCLUSION**

In this paper the mean ranking of variables affecting inventory management in 44 small scale industries is clearly portrayed. The major variables affecting inventory management identified were raw materials inventory turnover ratio which encompasses the volume of safety stock against material shortages that interrupt production, considerations of economy in purchase, the outlook for future movements in the price of materials, Anticipated volume of usage and consumption etc; Work in progress inventory turnover ration which influences the length of the complete production process, management policies affecting length of process time, length of process in runs, action that speed up the production process, e.g. adding second or third production shifts, management's skills in production scheduling and control, volume of production, Sales expectations etc and finished goods inventory turnover ratio which affects sales policies of the firm, need for maintaining stability in production, price fluctuations for the product, durability, spoilage and obsolescence, distribution system, ability to fill orders immediately etc. The results of ranking tables revealed that the major variables affecting inventory management are Overall inventory turnover ratio, Raw material inventory turnover ratio, Work-in-process inventory turnover ratio, Finished goods inventory turnover ratio and Out of stock index. The variable Raw material inventory turnover ratio emerged as the main variable affecting inventory management and out of stock index being the least decipherable effectuating variable entertained in managing inventories. From the practical perspective, the government functionaries must take initiatives to organise trade shows, seminars, workshops, conferences to strengthen supply chain linkages by integrating fragmented Supply chain intermediaries. Sensitizing managers through periodic


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Table 1.1: Results Showing Factor Loadings and Variance Explained After Scale Purification for Inventory Management

| Factor-wise Dimensions | Mean | S.D | F.L | Eigen Value | Variance Explained % | Cumulative Variance % | Comm-unality | α |
|---|---|---|---|---|---|---|---|---|
| **F1 (Economy & efficiency)** | **4.17** | **.482** | | **8.204** | **17.300** | **17.300** | | **.8022** |
| Brings potential savings | 4.13 | .408 | .828 | | | | .852 | |
| Avoids costly interruptions in operations | 4.18 | .390 | .807 | | | | .797 | |
| Facilitates purchase economies | 4.22 | .522 | .711 | | | | .742 | |
| Results in effective utilization of human & equipment | 4.18 | .390 | .608 | | | | .679 | |
| Inventory is in accordance to the firm size | 4.13 | .701 | .598 | | | | .566 | |
| **F2 (Service optimisation)** | **4.18** | **.391** | | **3.643** | **15.700** | **33.000** | | **.8231** |
| Ensures customer confidence | 4.27 | .450 | .386 | | | | .844 | .795 |
| Consistent with safety & economic advantage | 4.20 | .408 | .790 | | | | .795 | .820 |
| Facilitates cost accounting activities | 4.13 | .347 | .726 | | | | .820 | .735 |
| Improves service level | 4.13 | .347 | .563 | | | | .735 | |
| **F3 (Inventory stablisation)** | **3.89** | **.531** | | **2.923** | **15.504** | **48.504** | | **.8293** |
| Price fluctuation | 3.90 | .520 | .888 | | | | .897 | |
| Warehousing facilities | 3.86 | .553 | .870 | | | | .793 | |
| Inventory catalogue & control | 3.90 | .520 | .744 | | | | .761 | |
| **F4 (Cost reduction)** | **4.11** | **.473** | | **1.646** | **10.863** | **59.367** | | **.6273** |
| Reduces storage costs | 4.04 | .680 | .790 | | | | .837 | |
| Affects revenue costs | 4.15 | .370 | .734 | | | | .831 | |
| Adequate inventories are always there | 4.15 | .370 | .517 | | | | .641 | |
| **F5 (Competitive ability)** | **4.19** | **.425** | | **1.298** | **9.217** | **68.584** | | **.6057** |
| Enhances market share | 4.20 | .461 | .873 | | | | .791 | |
| Paves for competitive ability | 4.18 | .390 | .718 | | | | .654 | |

Footnotes: KMO Value =.688; Bartlett's Test of Sphercity = 451.76, df = 153,
Sig. =.000; Extraction Method Principal Component Analysis;
Varimax with Kaiser Normalisation; Rotation converged in 11 iterations;
'FL' stands for Factor Loadings, 'S.D' for Standard Deviation and 'α' for Alpha.

training & education programmes the need & strategies for profitable inventory management so that effectuate inventory decisions can be taken in order to equilibrium demand and supply.

## LIMITATIONS OF THE STUDY

i.The study is area specific and cannot be generalised for other managers operating in other parts of the country having dissimilar environmental business conditions.

ii.The conclusions drawn were not completely free from biasness for the responses obtained from the different retailers through surveys. Meaning and concepts of all scale items was explained to the respondents in local dialect as majority of them were neo-literate. Though utmost care was taken to entice correct information, an element of subjectivity cannot be ruled out as it made little difference in the originality of ideas obtained in the field survey and final interpretation.

## DIRECTIONS FOR FUTURE RESEARCH

Some of the dimensions like quality management, shared goals & objectives, SCM ethics, Transportation management, warehousing management, commitment & collaboration, transparency etc. are not included in the existing study. So, future research can be done taking into consideration the managers attitude towards the above dimensions. Future researches can also be undertaken regarding inventory management from the perspective of wholesalers and retailers for medium & large scale industries.

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Table 1.2: Unit-wise Benefits Derived From Material Standardisation

| Units/Benefits | Quality is ensured | Optimum production is possible | No switching costs | Better utilization of resources | Helps in Fixing Target Markets | Optimum stocks needs to be maintained | Less maintena-nce costs |
|---|---|---|---|---|---|---|---|
| Cement | 1.3 (I) | 2.1 (II) | 4.6 (V) | 3.6 (III) | 3.7 (IV) | 5.7 (VI) | 6.5 (VII) |
| Battery/Lead/Alloy | 1 (I) | 2.8 (II) | 4.4 (V) | 3.4 (III) | 4.4 (IV) | 5.2 (VI) | 6.8 (VII) |
| Pesticides/Insecticides | 1.6 (I) | 2 (II) | 2.6 (III) | 3.6 (IV) | 5 (V) | 6 (VI) | 7 (VII) |
| Conduit pipes | 1 (I) | 2 (II) | 3 (III) | 4 (IV) | 5 (V) | 6 (VI) | 7 (VII) |
| Menthol | 2 (II) | 1 (I) | 5 (V) | 4 (IV) | 3 (III) | 5 (VI) | 7 (VII) |
| Guns | 1 (I) | 2 (II) | 6 (VII) | 3 (III) | 4 (IV) | 4.5 (V) | 5 (VI) |
| Steel | 1.3 (I) | 1.6 (II) | 5 (VI) | 3.6 (III) | 5 (V) | 4.6 (IV) | 6.6 (VII) |
| Gates/Grills/Varnish/Paint | 1 (I) | 2.4 (II) | 7 (VI) | 5.6 (III) | 7.3 (VII) | 5.8 (IV) | 6.8 (V) |
| Atta/Maize/Dal mills | 1.3 (I) | 2 (II) | 5 (V) | 3.6 (III) | 3.6 (IV) | 5.6 (VI) | 6.6 (VII) |
| Others (Miscellaneous) | 1.1 (I) | 3.4 (III) | 5 (VI) | 3.1 (II) | 4 (IV) | 4.8 (V) | 6.3 (VII) |
| Mean & Rank | 1.2 (I) | 2.1 (II) | 4.7 (V) | 3.8 (III) | 4.5 (IV) | 5.3 (VI) | 6.5 (VII) |

Note: Where 1 denotes "highest rank" and 7 denotes "lowest rank".

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